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LIQUID COOLING APPARATUS

Filed Oct. 15, 1959

Fig. 1

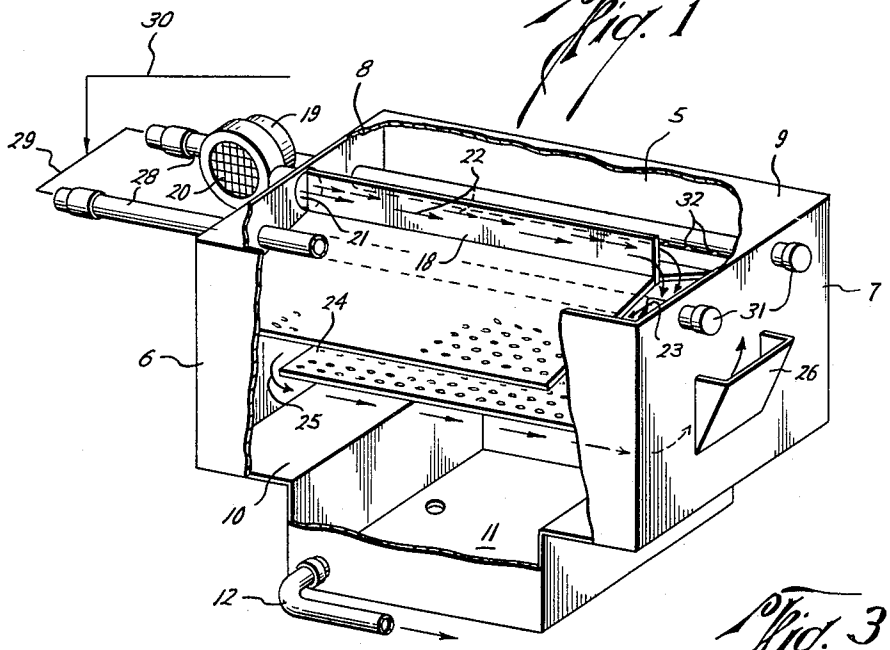


Fig. 3

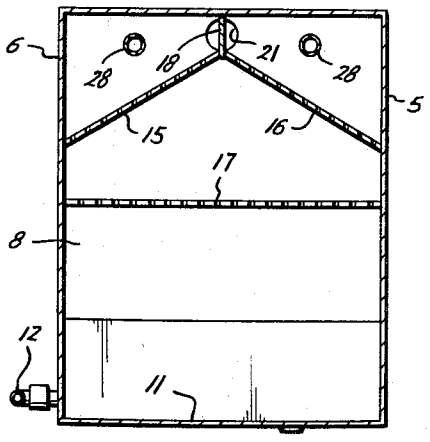
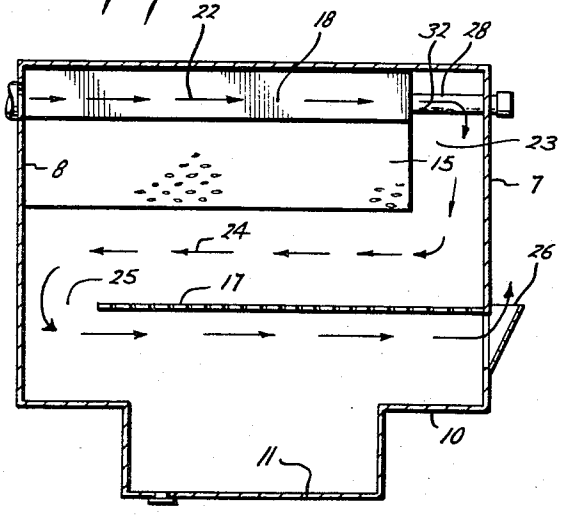


Fig. 2



Philip P. Hardcastle
Russell M. Prescott
INVENTORS

BY Bertram H. Mann
ATTORNEY

United States Patent Office

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LIQUID COOLING APPARATUS

Philip P. Hardcastle and Russell M. Prescott, Wichita, Kans., assignors to Cardwell Manufacturing Company, a partnership

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This invention relates to apparatus for cooling liquid, such as, for instance, the water circulated through the hydraulic brake system.

The braking system frequently used in connection with the draw works of an oil field rig requires the supply of substantial volumes of cool water in order to maintain its efficiency. Consequently, a recirculation system with a compact yet efficient cooling apparatus for the water results in more efficient operation of the braking system and permits the utilization of a minimum quantity of water for this purpose.

It is the main object of the present invention to provide such a cooling apparatus.

According to the present invention, this object is achieved by spraying the heated liquid returned from the water using device into the upper portion of a confined space, collecting and re-comminuting the sprayed liquid at intervals during its downward fall in the space, circulating streams of air back and forth across the paths of the descending liquid, and collecting the liquid at the bottom of the confined space for reuse. The novel apparatus consists of a casing having vertically spaced perforated baffles therein, a pair of liquid spraying nozzles in the upper portion thereof, and an air blower also directed into the upper portion. The baffles are provided with cross passages for directing the air stream back and forth across the baffles.

In the accompanying drawings which illustrate the invention,

FIG. 1 is an isometric view and diagram of the novel apparatus, the forward wall being broken away to illustrate the underlying parts.

FIG. 2 is a vertical transverse section through the apparatus.

FIG. 3 is a vertical section taken at 90° to FIG. 2.

The apparatus consists of a casing having front and back walls **5** and **6**, side walls **7** and **8**, and top and bottom walls **9** and **10**. Bottom wall **10** is recessed as at **11** to form a collecting basin from which a pipe **12** returns the collected and cooled liquid to the liquid using system.

Mounted within the casing are perforated baffles **15** and **16** disposed in an inverted V, and horizontal baffle **17** spaced therebeneath. A divider partition **18** extends from the apex of baffle **15**, **16** substantially to top wall **9**. An air blower **19** has an inlet **20** outside the casing and an exhaust **21** directed into the upper part of the casing and divided by partition **18** to supply streams of air above baffles **15** and **16** and flowing thereacross, as represented by arrows **22**. The latter baffles terminate short of side wall **7** to form a down or cross passage **23** for directing the stream of air around the end of baffles **15** and **16** and thence back, as represented by the arrows **25**, across lower perforated baffle **17**. Baffle **17**, in turn, terminates short of casing side wall **8** to form a cross or down passage **25** leading around baffle **17** for directing the air stream downwardly across baffle **17** thence back beneath the baffle. Air is exhausted from the casing through a discharge spout **26**. Water is fed into the top of the casing through pipes **28** connected by a manifold **29** to the return passage from the water using device, represented diagrammatically by line **30**. Pipes **28** extend entirely across the casing, respectively above and centrally

of baffles **15** and **16**, and their distal extremities are supported in opposite wall **7** where they are capped, as at **31**. The portions of pipes **28** within the casing are perforated, as at **32**, forming nozzles for spraying the liquid upon baffles **15** and **16**.

In operation, hot liquid is directed through piping lines **30** and **29**, to perforated pipes **28**, whence it is sprayed onto baffles **15** and **16**, the liquid thus collected runs down these latter-mentioned baffles, thence is re-comminuted in dropping through the perforations thereof onto lower baffle **17**, where the droplets are again temporarily halted and re-comminuted in passing through the perforations of this latter baffle. At the same time, air is blown from exhaust duct **21** in dual streams, first across upper baffles **15**, **16**, thence downwardly around these baffles, back between the vertically spaced baffles, downwardly around baffle **17**, and finally across the space beneath the lower baffle and out through discharge nozzle **6**. The evaporation and consequent cooling of the liquid are accelerated by the spraying and successive collecting and re-comminuting thereof, as well as by the back and forth air currents. The cooled liquid is collected in recessed sump space **11** for resupply through piping **12** and a suitable water pump to the consuming device.

The size of the casing and the number of baffles may be varied in accordance with the quantity of liquid which must be cooled and the rate of cooling desired. The invention may be modified in these and other respects as will occur to those skilled in the art and the exclusive use of all modifications as come within the scope of the appended claims is contemplated.

We claim:

1. Liquid cooling apparatus comprising a casing, a pair of perforated baffles mounted therein in inverted V relationship, a vertical divider panel extending upwardly from the apex of said pair of baffles, a second, horizontally extending, perforated baffle spaced directly beneath said first baffles, means to discharge comminuted liquid above each of said pair of baffles for dripping through said baffles, means to draw off said liquid from the bottom of said casing, and means to discharge a stream of air into said casing from one side thereof across the upper surfaces of each of said first pair of baffles, there being a down passage around said pair of baffles adjacent the opposite side of said casing for directing said air stream therethrough, thence back to said first side between said baffles for assisting in vaporization and cooling of the dripping liquid.

2. Liquid cooling apparatus as described in claim 1 further including an air outlet below all of said baffles and a second down passage around said second baffle opposite and in staggered relationship to both said first down passage and said air outlet passage for directing the air stream around said second baffle thence back beneath the same to said outlet.

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